

## **Atomic Absorption Determination of Potash in the Citrate Extract of Fertilizer**

### **1.0 Scope**

This method is a screening procedure that can be used to determine potash in fertilizers, using the extract prepared for citrate soluble phosphorus or direct available phosphorus.

### **2.0 Summary**

Direct available phosphorus extracts or ammonium citrate extracts of fertilizer samples are aspirated into an atomic absorption flame after calibration with potassium standards containing the same amount of ammonium citrate. Calibration is done at a secondary wavelength to limit or eliminate the need for dilutions and sample concentrations are read directly in ppm K or  $K_2O$ .

### **3.0 Apparatus**

Atomic absorption spectrophotometer with potassium hollow cathode lamp.

### **4.0 Procedure**

- 4.1 Use a portion of the extract prepared for the direct available  $P_2O_5$  determination or a portion of the ammonium citrate extract prepared for screening  $P_2O_5$ .
- 4.2 Use a standard stock solution of 10,000 ppm potassium.
- 4.3 Prepare at least two calibration standards in the range of 500 to 1000 ppm K by pipetting appropriate aliquots of the stock solution into 100 ml volumetric flasks adding 20.0 ml of ammonium citrate solution before diluting to volume with deionized water.
- 4.4 Alternately, prepare at least two calibration standards in the range of 100 to 400 ppm K by pipetting appropriate aliquots of a stock potassium standard into 100 ml volumetric flasks adding 20.0 ml of ammonium citrate solution before diluting to volume with deionized water.
- 4.5 Consult the instrument operation manual for instrument set up and operation.

- 4.6 Optimize at the secondary potassium line (404.4 nm) to reduce sensitivity and to incorporate the high concentration range. Use the proper slit setting and an integration time of about 1.5 seconds.
- 4.7 Auto zero the instrument with a 1:5 dilution of the ammonium citrate solution used for sample extraction.
- 4.8 Calibrate the instrument with one of the higher level standards and check for linearity by reading one or more of the other standards. Do not work with a one point calibration beyond the linear operating range. If sample concentrations are expected to be beyond the linear range either dilute the samples and make the ammonium citrate concentration equivalent to that in the undiluted samples or do a two point calibration.
- 4.9 When calibration is complete, aspirate the sample extracts and record the average of at least four readings. Read standards frequently and recalibrate if instrumental conditions have changed.
- 4.10 The ammonium citrate solution will dry on the burner head and might cause an erratic flame. If this happens, a burner cleaning might be necessary during the run.
- 5.0 Calculations
- 5.1 If sample concentrations are read as ppm  $K_2O$ , calculate the %  $K_2O$  as follows:
- $$\% K_2O = (\text{ppm } K_2O)(F/\text{sample wt})(10^{-4})$$
- Where  $F = \frac{(\text{ml original volume})(\text{dilution volume})}{(\text{dilution aliquot})}$
- 5.2 If sample concentrations are read as ppm K, calculate the %  $K_2O$  as follows:
- $$\% K_2O = (\text{ppm K})(F/\text{sample wt})(10^{-4})(1.2046)$$
- Where  $F = \frac{(\text{ml original volume})(\text{dilution volume})}{(\text{dilution aliquot})}$